A Survey of Fish and Shellfish Consumption by Residents of the Greater New Orleans Area

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ABSTRACT

A survey of fish and shellfish consumption patterns was conducted in the greater New Orleans area (Orleans, Jefferson and St. Bernard parishes) by telephone interviews of 405 residents. Respondents were asked for basic demographic information, seafood* consumption over the past 7 days, information on each seafood meal consumed including species, how it was prepared, amount consumed, etc. Respondents were also asked about fishing practices, if they fished for fun or for food, how often they fished, where, etc. Interviews lasted up to 20 minutes depending on the number of seafood meals reported.

The interviews showed that 61.2% of respondents had eaten at least 1 seafood meal in the last week. Another 34% reported eating seafood, but not in the past seven days. Only 5% of the sample reported never eating seafood. The preferred seafoods were shrimp, followed by catfish, speckled trout, crab and other salt water fish. These preferences do not take into account seasonal availability of various fisheries products. Shrimp were most often boiled or fried, while catfish and trout were usually fried.

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* For the purposes of this report, the term "seafood" is used generically to include both fresh water and salt water fin fish, as well as shrimp, crabs, crawfish and oysters.

Estimated daily seafood consumption rates were calculated based on median responses for 1 seafood meal per week as follows: catfish - 22.7 grams; other fresh water fish - 10.4 grams; speckled trout - 30.8 grams; other salt water fish - 29 grams; shrimp - 16.3 to 32.6 grams; crabs - 26 grams; crawfish 13.6 to 19.5 grams. The daily seafood consumption rates for 2 seafood meals per week were: catfish - 45.5 grams; other fresh water fish - 20.9 grams; speckled trout - 61.5 grams; other salt water fish - 58 grams; shrimp - 32.6 to 65.1 grams; crabs - 52 grams; crawfish 26 to 39 grams.

Eating fish or seafood in the previous week did not vary with race, gender, income or religion. Thus, minority and low income individuals in the greater New Orleans area do not appear to be at additional risk when fish/shellfish is a suspected exposure pathway for environmental contaminants.

A vendor survey was also conducted to determine the quantities and species of fish and other seafoods available in the wholesale and retail market. Since Louisiana is the nation's second leading state in seafood landings, it is assumed that most of the products sold at retail originate locally. Exceptions are catfish, some shrimp and perhaps crab claws.

The findings of this study are important in conducting site specific risk assessments where fish and shellfish may be suspected

sources of exposure to environmental contaminants. The data provide information on types, quantities and sources of seafood products that may be consumed, preparation and cooking methods, and an estimate of the exposed population. A survey of the entire state over a full year would give more complete data to be used in risk assessments where fish and seafood are considered potential exposure media for environmental contaminants.

INTRODUCTION

Contamination of fish and shellfish by toxic chemicals including heavy metals, polychlorinated biphenyls (PCBs), pesticides, volatile organic compounds (VOCs) and other priority pollutants is a growing problem in many areas of the United States. This has prompted a majority of the states to survey waterbodies annually for contaminants in fish and shellfish tissues. (Cunningham et al., 1990).

Consumption of contaminated fish/shellfish products may pose a substantial risk to human health. The risk may be further exacerbated by an increasing rate of fish consumption in the U.S.; an estimated increase from an average of 13 g/day per capita in 1960 to 21 g/day in 1986 (USDA, 1985; USDA, 1986). These concerns have prompted several studies of fish consumption patterns by people living on the west coast (Puffer et al., 1982; McCallum, 1985; Landolt et al., 1985), the Great Lakes (Humphrey, 1983, Sonzogni and Swain, 1984; Humphrey, 1988; West et. al., 1989), near New York Bay and Newark Bay (Belton et al, 1986) and in other areas (Cunningham, 1990). In addition, the EPA has recently issued a guidance manual for assessing human health risks associated with contaminated fish/shellfish products (EPA, 1989).

A recent survey of the states revealed that 30 states use some form of risk assessment (EPA methods or others) to advise the public of

potential health risks associated with consumption of contaminated fish (Cunningham, 1990). However, the same survey indicated considerable variation in the fish consumption values used to calculate the risk. For example, the most frequently used rates were: 6.5 g/day (national average), 20 g/day(coastal states), 165 g/day (99th percentile) or a "population specific" consumption value (Cunningham, 1990).

It is clear that considerable uncertainty exists in the risk characterization when such "standard value" estimates of fish/shellfish consumption, derived for the U.S. population as a whole, are extrapolated to a distinct geographical region or subpopulation. Indeed, EPA recommends that "local or regional assessments of fish/shellfish consumption be performed whenever possible to avoid possible errors inherent in extrapolating standard values for the U.S. population to distinct subpopulations" (EPA, 1989).

This is particularly true for Louisiana since this state is second only to Alaska in total fisheries products. In 1989, Louisiana had total commercial landings of 1.2 billion pounds with a commercial value of $264.3 million (NMFS, 1990). Louisiana led the Gulf states in oyster landings, contributing 77% of the Gulf catch and 50% of the national total. Louisiana also led all Gulf states in shrimp landings with over one (1) million pounds harvested. Louisiana was the leader in industrial fisheries products as well,

accounting for $68.7 million or 33% of the national total (NMFS, 1990). To indicate the bounty of the Louisiana seafood harvest, Table 1 gives a partial list of Louisiana commercial landings for 1988 and 1989 (NMFS, 1989).

Since seafood* is such an integral part of life in Louisiana, it is particularly important to assess local fish/shellfish consumption patterns and to establish appropriate seafood consumption criteria and risk assessment guidelines for Louisiana residents. The purpose of this project, therefore, was to begin to determine fish and shellfish consumption patterns by persons living in Louisiana, using the greater New Orleans area as a study site.

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* For the purposes of this report, the term "seafood" is used generically to mean salt water and fresh water fin fish as well as shrimp, oysters, crawfish and crabs.

TABLE 1. LOUISIANA LANDINGS (LBS) OF SELECTED SPECIES, 1988 - 1989 (NMFS, 1989)

SPECIES	1988	1989
FISH		
Catfish	5,423,263	6,110,940
Drum, Black	8,756,913	4,405,882
Drum, Red	245,365	24,811
Flounders	510,285	492,047
Grouper & Scamp	389,190	203,447
Grouper, Yellowedge	118,519	15,102
Menhaden	1,116,647,885	1,019,168,340
Mullet, Black	2,367,106	2,413,763
Sea Trout, Spotted	1,433,408	1,488,878
Sheephead, Atlantic	1,848,679	2,450,139
Snapper, Red	1,820,071	1,491,327
Swordfish	1,320,647	999,530
Tuna, Bluefin	254,545	133,874
Total Fish	1,169,468,801	1,063,505,964
SHELL FISH		
Crab, Blue, Hard	53,554,485	33,390,070
Crawfish, Freshwater	19,683,543	27,977,153
Oysters, Total	13,253,772	11,605,856
Total Shellfish	86,774,786	73,266,581
Shrimp, Saltwater	102,621,065	100,444,239
GRAND TOTAL	1,358,864,652	1,237,216,784

OBJECTIVES

The objectives of the study were:

1. To review existing fish/shellfish consumption survey instruments
2. To develop, refine and validate a fish/shellfish consumption survey instrument applicable to Louisiana
3. To determine fish/shellfish consumption patterns of the general population in the greater New Orleans area (Orleans, Jefferson and St. Bernard Parishes), using the survey instrument developed
4. To conduct a "vendor" survey to determine what proportion of seafood distributed to area wholesalers and retailers is of Louisiana origin.

METHODS

I. Objectives 1 and 2 - Review existing surveys; develop, refine and validate a survey instrument applicable to Louisiana:

Designing an appropriate state survey instrument was a prime objective of the study. Input from LDEQ was solicited for this task and existing survey instruments were reviewed as follows:

- The Michigan Fish Eaters Survey (Michigan Toxic Substances Control Commission, 1987)
- Monthly Fish and Seafood Serving and Eating Diary (National Consumer Panel, 1981)

- National Food Consumption Survey (USDA, 1978)
- Continuing Survey of Food Intakes by Individuals (National Analysts, 1987)
- Seafood Consumption Patterns (NPD, 1977)

A telephone recall survey was selected as the appropriate survey instrument; a 7 day recall period was selected. Survey questions were generated following review of the surveys cited above, data provided by LDEQ and reports by Hadlett and Raab (1990), West et. al, 1989, West et. al.(in preparation) and Renwick (1991).

The survey focused on a random sample of the general population as decided in consultation with LDEQ personnel. The principal questions addressed through the survey were:

- What is the relative distribution of fish/shellfish consumption by greater New Orleans citizens?
- How often do they eat local seafood and what kinds do they eat?
- What is the fish consumption rate?
- Can a sufficiently large sample be obtained to determine what subpopulations are most likely to consume local fish and shellfish? What is the fish consumption rate for the subpopulation? Is it different from the general population?

Once designed, the efficiency of the survey instrument was validated in a field trial so that ambiguous questions could be clarified and additional pertinent questions included.

II. Objective 3 - Determine fish/shellfish consumption patterns of the general population in the greater New Orleans area using the survey instrument developed:

The survey sample was derived and interviews conducted by Multi-Quest,Inc., a market research and opinion poll consulting firm located in Jefferson Parish , LA. The survey sample was derived randomly from parish area homes.

All residential telephone exchanges in the metropolitan area of interest were obtained from So. Central Bell, Inc. Telephone numbers were developed by combining each residential telephone exchange of the metropolitan area with four random digits generated through a proprietary random digit generating program. This insured including unlisted and delisted numbers. The sample was stratified by exchange to assure that each geographical area was represented according to its proportion of the population. The number of interviews per exchange was determined by allocating quotas based on actual number of residential telephone households in each exchange. The number of telephone households per exchange was based upon the latest available updates of telephone company

information. The specific details of this procedure are a proprietary application of standard procedures refined by Multiquest, Inc. for projects of this nature. St. Bernard parish was over sampled in an attempt to increase the rate of rural respondents.

Interviewing controls and validation of interviewer work was as follows: Interviewers were thoroughly briefed with a standardized set of written instructions. Interviewers, all with extensive experience in handling the questioning process, were utilized to reduce any bias due to individual inflections or other voice patterns. No interviewer was permitted to complete more than 50 interviews.

Interviews were held daily with approximately 1/3 of the interviewing time during the day and 2/3 during evening hours. By calling mostly in the evening, employees with standard work schedules would be accessed as well as those not employed, retired, etc. Day time calling accesses those with non standard schedules (shift work, entertainment related occupations, etc.) requiring night work.

The sampling procedure was rigidly controlled with up to 4 attempts made to a household before alternative numbers to the same exchange were selected. This process maximizes the number of completed

interviews from the smallest sampling of households within reasonable budget constraints.

Ten percent of each interviewers work was validated by call back of respondents. If any of a person's work showed discrepancies, a 100% validation of that person's work was verified. If any surveys proved invalid, it was proposed to replace all of the interviewer's work and not include that information in the tabulations. This proved to be unnecessary. All of the work was done from Multiquest's central telephone location which provided for continuous monitoring of interviewer progress, efficiency, verbalization and validity.

III. Objective 4 - Conduct a vendor survey to determine what proportion of seafood distributed to area wholesalers and retailers is of Louisiana origin:

To meet this objective, all of the seafood wholesalers and retailers in the parishes of Orleans, Jefferson, St. Bernard and Plaquemines were identified via the listings in the South Central Bell "Yellow Pages". All of these seafood wholesalers and retailers were contacted by telephone and asked if they would be willing to answer a survey sent in the mail to determine their volume and distribution of Louisiana seafood products. Those that responded positively were sent the survey form included as Appendix 1.

The survey asked for the total pounds of various seafood products sold, total pounds of product coming from Louisiana and the total pounds sold in Louisiana. The seafood products included various species of fin fish, crabs, shrimp, oysters, crawfish, alligator and others.

In addition, ancillary data were collected to help augment the fish consumption data and to draw a general picture of fish consumption patterns throughout the state. Items included:

- Number of sport fishing licenses issued
- Number of commercial fishing licenses issued
- Commercial landings data

RESULTS AND DISCUSSION

I. Objectives 1 and 2 - Review existing fish/shellfish consumption survey instruments, develop, refine and validate a survey instrument applicable to Louisiana:

The surveys cited in the Methods section were reviewed in preparing the survey instrument for this project. The questions designated for this survey were reviewed and revised by LDEQ before actual sampling of the population began.

Once designed, the efficiency of the survey instrument was validated in a field trial. Ten individuals were interviewed by

telephone and refinements to the survey form were made to clarify ambiguous questions and to include additional pertinent questions.

The final survey instrument for this study is included in Appendix 2. The survey form includes basic demographics, fishing practices (sport vs. subsistence), and fish/seafood consumption practices. Among the parameters addressed in the survey were:

- Standard Demographics
- Economic/Educational Background
- Religion
- Fish/Shellfish Consumption Patterns
- Species Eaten
- Form of Species Consumed
- Cooking Method
- Fish Consumption Rate - grams/day
- Store Bought or Sport Caught
- Geographic Location of Catch
- Fishing Practices

II. Objective 3 - to determine fish/shellfish consumption patterns of the general population in the greater New Orleans area:

The full survey was conducted in the summer of 1991 in the greater New Orleans area (Orleans, Jefferson and St. Bernard parishes), as determined in consultation with LDEQ personnel.

The sample size of 405 individuals was determined following analysis of the field trial and taking into account time and cost constraints. A total of 587 interviews were attempted to complete a total of 405. This provided a cooperation rate of 69% Interviews lasted up to 20 minutes, depending on the number of fish meals reported by respondents.

Among the 405 respondents, 20 individuals (5%), reported never eating fish or seafood. Table 2 shows that 45% of these persons are allergic to seafood, while another 30% don't like the taste. This differs from a survey done in Oregon that found that non fish eaters cited cost (41%), local availability (24%) and quality (22%) as the main reasons for not eating fresh fish (Hadlett and Raab, 1990).

Among the 405 individuals surveyed, an additional 137 respondents (34%) reported eating fish or shellfish, although not in the last week, and 248 individuals, (61%) reported eating fish or shellfish in the last week.

Table 3 details the demographic properties of the sample. The table shows that the sample was predominantly female (59.8%), white (74.1%) and Catholic (57.6%). There was a broad age distribution in the sample population. There was also a broad spectrum of income levels and occupations represented in the sample. It is interesting to note that 77.4% of those surveyed reported living in

TABLE 2. REASONS FOR NOT EATING FISH OR SHELLFISH

REASON	NUMBER	PERCENT
I am allergeric to it	9	45
I don't like the taste	6	30
I don't like the smell	1	5
It is against my beliefs	1	5
I am afraid it might be contaminated	1	5
I have medical reasons	1	5
I just perfer other food	1	5
TOTAL	20	100

TABLE 3. DEMOGRAPHIC PROPERTIES OF THE SAMPLE POPULATION

GENDER	NUMBER	PERCENT
Male	163	40.2
Female	242	59.8
Total	405	100.0
AGE	**NUMBER**	**PERCENT**
13-20	31	7.7
21-30	94	23.2
31-40	85	21.0
41-50	60	14.8
51-60	46	11.4
61-70	61	15.1
>70	23	5.7
No response	5	--
Total	405	100.0
OCCUPATION	**NUMBER**	**PERCENT**
Professional	105	26.2
Laborer	84	20.9
Clerical	28	7.0
Homemaker	72	18.0
Retired	49	12.2
Other	24	6.0
Student	39	9.7
No response	4	--
Total	405	100.0
AGE	**NUMBER**	**PERCENT**
Black	96	23.7
White	300	74.1
S.E. Asian	3	.7
Hispanic	4	1.0
Other	2	.5
Total	405	100.0

TABLE 3. DEMOGRAPHIC PROPERTIES OF THE SAMPLE POPULATION (Cont'd)

RELIGION	NUMBER	PERCENT
Catholic	227	57.6
Protestant	131	33.2
Other Christian	12	3.0
Jewish	3	.8
None	19	4.8
Hindu/Buddhist/Moslem	2	.5
No Response	11	--
Total	405	100.0
INCOME	**NUMBER**	**PERCENT**
<10,000	74	21.6
10,000-24,999	105	30.6
25,000-39,999	80	23.3
40,000-80,000	72	21.0
>80,000	12	3.5
No Response	62	--
Total	405	100.0
YEARS IN LA	**NUMBER**	**PERCENT**
<6	20	5.1
6-10	17	4.3
11-20	53	13.3
>20	308	77.4
No Reponse	7	--
Total	405	100.0
SEWER	**NUMBER**	**PERCENT**
Yes	388	95.8
No	17	4.2
Total	100	100.0

Louisiana for over 20 years. This has implications for risk assessment when length of exposure and frequency of exposure variables are considered. Over 95% of those surveyed reported living in an urban area as indicated by connection to a community sewerage system.

Respondents were asked if they had eaten fish or shellfish at breakfast, lunch, dinner or for a snack for each of the 7 days preceding the interview. Table 4 shows the number of times each of

the 248 positive respondents ate fish or shellfish during the preceding week. From the table one can calculate 395 fish or shellfish consumption incidents, with the majority of individuals (60.5%) reporting 1 seafood meal during the week. There was a total of 400 seafood meals; the sum in the table is less than 400 because the last category is "5 or more meals."

The number of times a specific type of seafood was eaten in the past week is indicated in Table 5. If only 1 seafood meal was eaten, the predominant choice of seafood was shrimp. Shrimp were selected in 32.3% of the meals, followed by catfish (25.8%), speckled trout (15.7%) and crab (12.5%). When more than 1 seafood meal was eaten during the past week, shrimp still predominated as the seafood of choice (14 meals, for 5.6%).

These values vary somewhat with those determined in a recent state

BLE 4. FREQUENCY AND PERCENT OF SEAFOOD MEALS CONSUMED BY THE SURVEY POPULATION

NUMBER OF MEALS	FREQUENCY	PERCENT
One	150	60.5
Two	62	25.0
Three	27	10.8
Four	5	2.0
Five or more	4	1.0
Total	248	100.0

TABLE 5. SEAFOOD PREFERENCE BY NUMBER OF MEALS CONSUMED

TYPE	NO MEALS NUMBER	NO MEALS PERCENT	ONE MEAL NUMBER	ONE MEAL PERCENT	MORE THAN ONE MEAL NUMBER	MORE THAN ONE MEAL PERCENT	TOTAL
Shrimp	154	62.1	80	32.3	14	5.6	248
Catfish	179	72.2	64	25.8	5	2.0	248
Speckled Trout	204	82.3	39	15.7	5	2.0	248
Crab	208	83.9	31	12.5	9	3.6	248
Other salt	218	87.9	24	9.7	6	2.4	248
Tuna	224	90.3	19	7.7	5	2.0	248
Crawfish	234	94.4	13	5.2	1	.4	248
Other fresh	238	96.0	7	2.8	3	1.8	248
Other	241	97.2	7	2.8	0	0.0	248
Oyster	242	97.6	6	2.4	0	0.0	248
Lobster	246	99.2	1	.4	1	.4	248
Don't know	241	97.2	7	2.8	0	0.0	248

wide opinion poll of Louisiana voters regarding seafood (Renwick, 1991). In that study, 181 voters in the New Orleans metropolitan area reported the following: 73.5% consumed 1 to 2 fin fish meals per week, 47% consumed 1 or 2 shrimp meals per week, 24.9% reported 1 to 2 crawfish meals per week and 17.7% said they ate 1 to 2 crabmeat meals weekly. These percentages are in part higher because data are pooled for 1 to 2 meals in the Renwick study versus the data reported in this study for 1 meal. The order of preference, differs in the two studies, with fin fish preferred over shrimp in the Renwick study. The method of recall also differed in the two studies. Renwick asked for usual consumption while this study sought consumption at specific, recent meals.

In this study, for 11% of the meals, respondents indicated that they ate combinations of fish or shellfish in a single meal. These data are summarized in Table 6. The table indicates the primary product and the secondary products by number and percent. For example, when shrimp were the primary product, the accompanying seafood product was most often crab (70.6%).

The source of the seafood is shown in Table 7. In the "all meals" category, each seafood could be eaten more than once during the 7 day recall period and, therefore, respondents are counted multiple times. In the "most recent meal" category, consumers are represented only once. The table shows that in the "all meals" category, restaurants accounted for the largest percent of shrimp and catfish meals, 43.4% and 45.8% respectively. Except for

TABLE 6. COMBINATION SEAFOOD MEALS CONSUMED

SHRIMP IS PRIMARY OTHER TYPES	NUMBER	PERCENT
Oysters	1	5.9
Crab	12	70.6
Crab and trout	1	5.9
Oysters, crab and crawfish	1	5.9
Catfish	1	5.9
Speckled or white trout	1	5.9
Total	17	100.0
CRAB IS PRIMARY OTHER TYPES	**NUMBER**	**PERCENT**
Shrimp	1	20.0
Shrimp and Crawfish	1	20.0
Crawfish	2	40.0
Flounder	1	20.0
Total	5	100.0
CRAWFISH IS PRIMARY OTHER TYPES	**NUMBER**	**PERCENT**
Oysters	1	15.4
CATFISH IS PRIMARY OTHER TYPES	**NUMBER**	**PERCENT**
Shrimp	2	15.4
Shrimp and oysters	1	7.7
Shrimp and crab	3	23.1
Shrimp, oysters and crab	2	15.4
Shrimp and crawfish	1	7.7
Crab	2	15.4
Flounder	1	7.7
Other salt water fish	1	7.7
Total	13	100.0

TABLE 6. COMBINATION SEAFOOD MEALS CONSUMED (Cont'd)

SPECKLED OR WHITE TROUT IS PRIMARY OTHER TYPES	NUMBER	PERCENT
Shrimp and oysters	1	20.0
Shrimp and crab	1	20.0
Oysters	1	20.0
Oysters and crawfish	1	20.0
Crab	1	20.0
Total	5	100.0
REDFISH IS PRIMARY OTHER TYPES	**NUMBER**	**PERCENT**
Gar	1	50.0
Tuna	1	50.0
Total	2	100.0
UNKNOWN IS PRIMARY OTHER TYPES	**NUMBER**	**PERCENT**
Shrimp	1	100.0

TABLE 7. SOURCE OF SEAFOOD FOR ALL MEALS AND MOST RECENT MEAL

SHRIMP	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
You caught it	1	1.0	0	0.0
A friend caught it	17	16.0	17	18.5
Fish market	14	13.2	11	12.0
Grocery store	15	14.2	13	14.1
Street vender	12	11.3	10	10.9
Restaurant	46	43.4	41	44.6
Other	1	.9	0	0.0
Don't know, no response	3	--	2	--
Total	109	100.0	94	100.0

CATFISH	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
You caught it	1	1.4	1	1.5
A friend caught it	7	9.7	6	9.0
Fish market	7	9.7	7	10.4
Grocery	22	30.6	20	29.9
Fish vendor	2	2.8	2	3.0
Restaurant	33	45.8	31	46.3
No response	2	--	2	--
Total	74	100.0	69	100.0

SPECKLED TROUT	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
You caught it	6	12.2	5	11.6
A friend caught it	22	44.9	18	41.9
Fish market	5	10.2	5	11.6
Grocery store	2	4.1	2	4.7
Restaurant	14	28.6	13	30.2
Don't know, no respons	1	--	1	--
Total	50	100.0	44	100.0

TABLE 7. SOURCE OF SEAFOOD FOR ALL MEALS & MOST RECENT MEAL (Cont'd)

CRAB	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
You caught it	2	4.4	2	5.4
A friend caught it	11	24.4	10	27.0
Fish market	18	40.0	13	35.1
Grocery store	2	4.4	2	5.4
Street vendor	2	4.4	1	2.7
Restaurant	6	13.3	5	13.5
Other	4	8.9	4	10.8
Don't know, no response	6	--	3	--
Total	51	100.0	40	100.0

SALT WATER FISH (not trout or tuna)	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
You caught it	2	5.7	2	6.9
A friend caught it	18	51.4	14	48.3
Fish market	2	5.7	2	6.9
Grocery store	4	11.4	4	13.8
Restaurant	9	25.7	7	24.1
No response	1	--	1	--
Total	36	100.0	30	100.0

TUNA	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
Grocery store	21	72.4	17	70.8
Restaurant	7	24.1	6	25.0
Other	1	3.4	1	4.2
Total	29	100.0	24	100.0

CRAWFISH	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
You caught it	1	7.1	1	7.7
Fish market	9	64.3	8	61.5
Restaurant	3	21.4	3	23.1
Other	1	7.1	1	7.7
No response	1	--	1	--
Total	15	100.0	14	100.0

ABLE 7. SOURCE OF SEAFOOD FOR ALL MEALS AND MOST RECENT MEAL (Cont'd)

FRESH WATER FISH (not catfish)	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
You caught it	4	30.8	3	30.0
A friend caught it	4	30.8	3	30.0
Grocery store	4	30.8	3	30.0
Restaurant	1	7.7	1	10.0
No response	4	--	0	--
Total	17	100.0	10	100.0

catfish and tuna, other fin fish were most often caught by the consumer or a friend: speckled trout, 57.1%; other salt water fish, 57.1%; fresh water fish, 61.6%. Crabs and crawfish were most often purchased at a fish market: crabs, 40%; crawfish, 64.3%. Tuna was most often purchased at a grocery store, 72.4%.

Understanding preparation, cooking and consumption practices is important in assessing the potential exposure to a contaminant in fish or seafood. If the toxic compound of interest is lipophilic, one would expect potentially greater exposure if fish is prepared with the skin on, or if the liver or roe is consumed. Similarly, if crawfish hepatopancreas ("fat") is eaten via "sucking the heads", more fat soluble contaminants could be ingested. Cooking methods can also influence the potential availability of fat soluble toxic compounds. Boiling or broiling is more beneficial than frying in reducing the fat content of fish filets and steaks and may potentially reduce exposure to fat soluble contaminants as well.

Table 8 indicates how fish or shellfish were prepared. As in the table above, there are 2 sets of frequency distributions. The "all meals" category includes all meals of that type of food and can include multiple responses; the "most recent meal" category includes only the most recent consumption. Data in the "all meals" category indicate that shrimp were most often fried (49.1%) or boiled (40.7%); catfish, fresh water fish and speckled trout were

TABLE 8. SEAFOOD PREPARATION METHODS

SHRIMP	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
Boiled	44	40.7	35	37.2
Broiled	7	6.5	7	7.4
Fried	53	49.1	48	51.1
Baked	1	0.9	1	1.1
Other	3	2.8	3	3.2
No response	1	--	0	--
Total	109	100.0	94	100.0

CATFISH	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
Broiled	10	13.5	8	11.6
Fried	60	81.1	57	82.6
Baked	4	5.4	4	5.8
Total	74	100.0	69	100.0

SPECKLED TROUT	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
Boiled	4	8.0	3	6.8
Broiled	8	16.0	8	18.2
Fried	33	66.0	29	65.9
Baked	5	10.0	4	9.1
Total	50	100.0	44	100.0

CRAB	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
Boiled	42	84.0	34	85.0
Fried	5	10.0	4	10.0
Baked	3	6.0	2	5.0
No response	1	--	0	--
Total	50	100.0	40	100.0

OTHER SALT (not Trout)	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERSON
Boiled	3	8.6	2	6.9
Broiled	16	45.7	13	44.8
Fried	9	25.7	8	27.6
Baked	7	20.0	6	20.7
No reponse	1	--	1	--
Total	36	100.0	30	100.0

TABLE 8. SEAFOOD PREPARATION METHODS (Cont'd)

CRAWFISH	ALL MEALS NUMBER	ALL MEALS PERCENT	ONE MEAL PER PERSON NUMBER	ONE MEAL PER PERSON PERCENT
Boiled	15	100.0	3	30.0
FRESH WATER FISH (not Catfish)	**ALL MEALS NUMBER**	**ALL MEALS PERCENT**	**ONE MEAL PER PERSON NUMBER**	**ONE MEAL PER PERSON PERCENT**
Broiled	4	30.8	3	30.0
Fried	7	53.8	5	50.0
Baked	2	15.4	2	20.0
No response	4	--	0	--
Total	17	100.0	10	100.0

most often fried (81.1%, 53.8%, and 66% respectively), while other salt water fish were broiled most often (45.7%). Crabs and crawfish were usually boiled (84% and 100% respectively).

There were 191 responses to questions concerning consumption of fish skin and internal organs. Respondents reported eating the skin in 24.7% of these. Respondents ate the skin in only 18.9% of 74 catfish meals, but in 38% of the 50 speckled or white trout meals. The respondents ate the livers or other internal organs in only 2 of the 191 fish meals. In 156 (83%) of the 189 meals for which information was available, the fish was a steak or filet. In 8 of 12 (67%) flounder meals, the fish was served whole.

There were 15 crawfish meals reported. This value is probably low since this survey was conducted at the end of the crawfish season. In 79% of these meals, the respondents "sucked the heads", which indicates that there may be increased potential for exposure to lipophilic contaminants found in crawfish.

Table 9 indicates the amounts of shellfish that respondents estimated were eaten. For shrimp, the median and modal response were both 0.25 - 0.50 pounds (114 - 228 grams). Of those who reported crab consumption in terms of numbers of crabs, the modal response was 6 crabs; the median response was 5 crabs. The remaining responses for crab consumption are for those who ate crabmeat (picked crab). For crawfish, both modal and median

TABLE 9. ESTIMATED AMOUNT OF SEAFOOD CONSUMED

SHRIMP	NUMBER	PERCENT
< .25 pound	28	25.7
.25 - .50 pound	40	36.7
.50 - .75 pound	26	23.9
.75 - 1 pound	8	7.3
1 - 1.5 pound	2	1.8
1.5 - 2 pounds	2	1.8
No response	3	--
Total	109	100.0
OYSTERS NUMBER EATEN	**NUMBER**	**PERCENT**
Six	2	33.3
Eight	1	16.7
Eighteen	1	16.7
Twenty four	2	33.3
Total	6	100.0
CRAB NUMBER EATEN	**NUMBER**	**PERCENT**
One	3	6.8
Two	7	15.9
Three	3	6.8
Four	5	11.4
Five	4	9.1
Six	9	20.5
Seven	4	9.1
Eight	1	2.3
Nine	1	2.3
Ten	1	2.3
Twelve	4	9.1
Fifteen	1	2.3
Twenty four	1	2.3
Sub-Total	44	100.0
Amount (Picked)		
< .25 pound	2	33.3
.25 - .50 pound	2	33.3
.50 - .75 pound	1	16.7
.75 - 1 pound	1	16.7
Sub-Total	6	100.0
No Response	1	--
Total	51	

TABLE 9. ESTIMATED AMOUNT OF SEAFOOD CONSUMED (Cont'd)

CRAWFISH	NUMBER	PERCENT
.25 - .50 pound	1	7.7
.50 - .75 pound	2	15.4
1 - 1.5 pound	3	23.1
2 - 3 pounds	5	38.5
4 or more pounds	2	15.4
No Response	2	--
Total	15,	100.0
TUNA	**NUMBER**	**PERCENT**
Amount (Fresh)		
< . 25 pound	2	28.6
.25 - .5 pound	4	57.1
.5 - .75 pound	1	14.3
Sub-Total	7	100.0
Amount (Canned)		
2 ounces	3	13.6
3 ounces	9	40.9
6 ounces	10	45.5
Sub-Total	22	100.0
Total	29	100.0

responses were 2 to 3 pounds (914 - 1371 grams). The median and modal response of those eating fresh tuna to be between 0.25 and 0.50 pounds (114 - 228 grams). The median response for those eating canned tuna was 3 ounces; the modal response was 6 ounces (171 grams).

Some respondents indicated the amount of fish eaten in terms of dimensions of the fish filet. The dimensions were converted to a volume by the formula:

Volume = length x width x height

To determine the estimated weight of fish based on estimated volume, several "control" samples of fish were measured and weighed. Volumes were calculated as noted above. Weights of the fish based on the volume were then calculated by using the conversion factor:

1 cu. cm. = 1 gram

When the calculated weights were compared to the actual weight of each "control" portion of fish, it was determined that the estimated weights were twice as large as they should have been. This is because the dimensions were given based on the largest (thickest) portion of the fish filet. When the original estimated volumes were converted to grams using the adjustment factor of 0.5, it was found that:

1 cu. inch = 8.5 grams.

The numbers of grams of fin fish in the following table were estimated in this manner.

Table 10 outlines the estimated grams of various fin fish species consumed by respondents in the survey. In 63 of 74 catfish meals, respondents indicated the dimensions of the fish and the number of pieces eaten. One respondent was deleted because of failure to provide all 3 dimensions needed for computation. The volume was calculated as noted above. The median response was 159.1 grams. Nine of the remaining respondents compared their catfish to the size of a quarter pound hamburger; 3 said the catfish portion was about the same size as the hamburger while 6 said it was larger. In 47 of 50 speckled trout meals, respondents provided dimensions of the fish and 46 of these responses were complete. The median number of grams consumed was 215.3. The modal response was between 246 and 410 grams. The remaining 3 respondents provided no information on the amount of fish eaten.

In 34 of 36 "other salt water fish" meals, respondents provided dimensions of the fish. the median response was 203.0 grams consumed. For "other fresh water fish" meals, 15 of 17 respondents provided dimensions of the fish. The median response was 73.0 grams consumed.

The average daily consumption of various seafoods was next

TABLE 10. ESTIMATED NUMBER OF GRAMS OF FIN FISH CONSUMED BY RESPONDENTS

CATFISH ESTIMATED GRAMS	NUMBER	PERCENT
< or = 82.00	7	11.3
82.01 - 102.5	9	14.5
102.51 - 123.0	10	16.2
123.01 - 164.0	7	11.3
164.01 - 205.0	10	16.2
205.01 - 246.0	4	6.5
246.01 - 410.0	7	11.3
> 410.0	8	12.9
No response	12	----
Total	74	100.0
SPECKLED TROUT ESTIMATED GRAMS	**NUMBER**	**PERCENT**
< or = 82.0	7	15.3
82.01 - 102.5	6	13.0
102.51 - 123.0	3	6.5
123.01 - 164.0	5	10.9
164.01 - 205.0	2	4.3
205.01 - 246.0	4	8.7
246.01 - 410.0	11	23.9
> 410.0	8	17.4
No response	4	----
Total	50	100.0
OTHER SALT WATER FISH ESTIMATED GRAMS	**NUMBER**	**PERCENT**
< or = 82.0	4	11.8
82.01 - 102.5	3	8.8
102.51 - 123.0	1	2.9
123.01 - 164.0	7	20.6
164.01 - 205.0	3	8.8
205.01 - 246.0	2	5.9
246.01 - 410.0	9	26.5
> 410.0	5	14.7
No response	2	----
Total	36	100.0
OTHER FRESH WATER FISH ESTIMATED GRAMS	**NUMBER**	**PERCENT**
< or = 82.0	7	46.7
82.01 - 102.5	3	20.0
102.51 - 123.0	1	6.7
123.01 - 164.0	1	6.7
164.01 - 205.0	0	0.0
205.01 - 246.0	0	0.0
246.01 - 410.0	1	6.7
> 410.0	2	13.3
No response	2	----
Total	17	100.0

calculated. Average daily consumption depends the number of meals consumed per week as well as the quantity eaten at a given meal. Sixty percent of respondents ate seafood once during the previous week and 25% ate seafood twice (Table 4). Data are given, therefore, based on one seafood meal per week and two seafood meals per week. The resulting amounts are given in Table 11 for the most commonly eaten foods based upon the median response. The form of the estimate varies with species since information was not obtained in the same way for all species.

For fin fish, the average consumption was estimated by multiplying the quantities given in Table 10 above by 1/7 (once per week) and by 2/7 (twice per week). For example, Table 11 indicates the daily consumption of catfish to be 22.7 grams based on one catfish meal per week and 49.5 grams based on two 65 catfish meals per week.

For crabs, the average consumption was based on a modal consumption of 6 boiled crabs (see Table 9). Several seafood processors gave an estimate of 15 boiled crabs = 1 pound, or 456 grams of meat. The calculation, therefore, based on one crab meal per week, as shown in Table 11, is:

6/15 X 456 grams = 182 grams/7 days = 26 grams

For crawfish, the average consumption was based on a median consumption of 2 to 3 pounds (Table 9). Several seafood processors

TABLE 11. ESTIMATED DAILY CONSUMPTION OF FISH/SHELLFISH

FOOD	ONE MEAL/WEEK	TWO MEALS/WEEK
Shrimp	16.3 - 32.6 grams	32.6 - 65.1 grams
Catfish	22.7 grams	49.5 grams
Speckled Trout	30.8 grams	61.5 grams
Other salt water fish	29.0 grams	58.0 grams
Tuna (fresh)	16.3 - 32.6 grams	32.6 - 65.1 grams
Other fresh water fish	10.4 grams	20.9 grams
Crawfish	13.0 - 19.5 grams	26.0 - 39.0 grams
Crab	26.0 grams	52.0 grams

estimated that 10 pounds of boiled crawfish = 1 pound of meat. The calculation, therefore, based on one crawfish meal per week, as shown in Table 11, is:

for 2 pounds - 914 grams X 0.1 / 7 = 13.6 grams

for 3 pounds - 1371 grams X 0.1 / 7 = 19.5 grams

Based on data from processors and restaurentures, shrimp were sized as follows: 0.25 pounds of shrimp = 25 salad shrimp, 10 medium shrimp; 8 larg shrimp or 4 jumbo shrimp, respectively. All rates were for meat, exluding heads and shells. For shrimp, the median response (Table 9) was 0.25 to 0.5 pounds of shrimp consumed. The calculation for shrimp, based on one shrimp meal per week, as indicated in Table 11, is:

for 0.25 pounds - 0.25 X 456 grams = 114 grams / 7 = 16.3 g

for 0.5 pounds - 0.5 X 456 grams = 228 grams / 7 = 32.6 g

Table 12 indicates the number of persons who ate seafood by time of day and day of week. The predominant seafood meal was dinner; the predominant day for a seafood meal was Friday.

In the past, Catholics were required to abstain from meat on Fridays. The data were examined to determine if the "fish on Friday" pattern is practiced predominantly by Catholics. Table 13 shows seafood consumption patterns by religion. While more seafood meals were eaten by Catholics on Friday, they are not more likely than others to have eaten at least one seafood meal ($p = 0.81$).

TABLE 12. NUMBER OF INDIVIDUALS CONSUMING FISH/SHELLFISH BY MEAL AND DAY OF WEEK

DAY	MEAL				TOTAL
	BREAKFAST	LUNCH	DINNER	SNACK	
Monday	1	15	30	0	46
Tuesday	1	18	30	0	49
Wednesday	0	13	32	0	45
Thursday	0	15	17	0	32
Friday	1	31	78	0	110
Saturday	0	19	46	2	67
Sunday	0	13	38	0	51
Total	3	124	271	2	400

TABLE 13. FISH/SHELLFISH CO..UMPTION PATTERNS BY RELIGION

DAY	CATHOLIC					NONCATHOLIC				
	BREAKFAST	LUNCH	DINNER	SNACK	TOTAL	BREAKFAST	LUNCH	DINNER	SNACK	TOTAL
Monday	0	9	14	0	23	1	6	16	0	23
Tuesday	0	9	13	0	22	1	9	17	0	27
Wednesday	0	10	20	0	30	0	3	12	0	15
Thursday	0	9	11	0	20	0	6	6	0	12
Friday	0	22	55	0	77	1	9	23	0	33
Saturday	0	10	22	1	33	0	9	24	1	34
Sunday	0	10	19	0	29	0	3	19	0	22
Total	0	79	154	1	234	3	45	114	1	166

There are also no differences in the number of seafood meals eaten ($p = 0.58$).

Those who ate seafood in the previous week recall period were next compared with those who did not consume seafood. Those who stated that they never eat seafood were excluded. The data are presented in Table 14. The percentages in the table are the percents in each category who either did or did not eat seafood.

The relationships between eating seafood in the last week and the demographic variables indicated in Table 14 were explored statistically with the chi square test. This test is used to determine the relationship between two categorical variables. The null hypothesis is that there is no relationship; the alternative is that there is a relationship. Thus, a small p value (alpha) indicates that there is a relationship between the two variables. It is standard to conclude that there is a relationship between two variables when the p value is less than or equal to 0.05.

Analysis of the data presented in Table 14 indicates that consumption of fish or shellfish during the 7 day recall period was not associated with gender, race, religion or income. Seafood consumption was associated with age and whether consumers resided in an urban or rural area as indicated by access to a community sewerage system. Note however, that there were very few rural

TABLE 14. RELATIONSHIP OF FISH OR SHELLFISH CONSUMPTION TO DEMOGRAPHIC VARIABLES

ATE FISH LAST WEEK

	YES		NO		
GENDER	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL %
Male	97	61.0	62	39.0	100.0
Female	151	66.8	75	33.2	100.0
Total	248	64.4	137	35.6	100.0

Chi square = 1.37, df = 1, p = .24

ATE FISH IN THE LAST WEEK

	YES		NO		
AGE	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL %
< 20	20	40.0	15	60.0	100.0
20-49	144	64.3	80	35.7	100.0
> 49	91	69.5	40	30.5	100.0
Total	245	64.5	135	35.5	100.0
No response	3		2		

Chi square = 7.99, df = 2, p = .019

ATE FISH IN THE LAST WEEK

	YES		NO		
OCCUPATION	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL %
Professional	71	71.0	29	29.0	100.0
Laborer	53	65.4	28	34.6	100.0
Homemaker	44	66.7	22	33.3	100.0
Retired	30	62.5	18	37.5	100.0
Clerical	12	92.3	1	7.7	100.0
Other	17	48.5	18	51.5	100.0
Total	248	66.3	137	33.7	100.0
No response	21		18		

Chi square = 10.17, df = 5, p = .071

ATE FISH IN THE LAST WEEK

	YES		NO		
RACE	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL %
Black	57	61.3	36	38.7	100.0
White	188	66.4	95	33.6	100.0
Total	245	65.2	131	34.8	100.0
Other	3		6		

Chi square = .82, df = 1, p = .37

ATE FISH IN THE LAST WEEK

	YES		NO		
RELIGION	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL %
Catholic	139	65.0	75	35.0	100.0
Protestant & other	102	63.7	58	36.3	100.0
Total	241	64.4	133	35.6	100.0
No response	7		4		

Chi square = .06, df = 1, p = .81

TABLE 14. RELATIONSHIP OF FISH OR SHELLFISH CONSUMPTION TO DEMOGRAPHIC VARIABLES (Cont'd)

ATE FISH IN THE LAST WEEK

	YES		NO		
INCOME	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL %
< $10,000	41	59.4	28	40.6	100.0
$10,000-24,999	60	60.6	39	39.4	100.0
$25,999-39,999	50	66.7	25	33.3	100.0
$40,000-80,000	52	73.2	19	26.8	100.0
> $80,000	10	90.9	1	9.1	100.0
Total	213	65.5	112	34.5	100.0
Don't know or refused	35		25		

Chi square = 7.25, df = 5, p = .12

ATE FISH LAST WEEK

	YES		NO		
SEWER	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL %
Yes	242	65.4	128	34.6	100.0
No	6	40.0	9	60.6	100.0
Total	248	64.6	136	35.4	100.0

Chi square = 4.06, df = 1, p = .044

respondents. Seafood consumption was marginally associated with occupation.

It is particularly relevant to note that no differences in fish and seafood consumption were found with differences in race or income. A similar survey of minority populations in Michigan showed that the associations between fish consumption and race or income to be "marginally non significant" (West et al., in preparation). This study indicates that low income individuals or minorities in the greater New Orleans area would not be considered at additional risk when assessments associated with fish consumption are calculated.

A series of questions was asked to determine fishing practices of respondents. This was done in an attempt to identify sport and subsistence fishermen and to determine if fishing influenced fish consumption. Table 15 indicates that 67.9% of the respondents do not fish and that 31.4% fish for recreation. Subsistence fishermen accounted for less than 1% of the sample.

For analyses, all those who fish were combined into 1 category. Table 16 shows how fishing behavior is related to demographic variables and to fish consumption. Fishing is associated with being male and being a laborer. Those who fish were more likely to have eaten fish in the previous week than those who do not fish.

Table 17 shows the number of times respondents fished per year. Of

TABLE 15. FISHING BEHAVIOR OF RESPONDENTS

BEHAVIOR	NUMBER	PERCENT
Don't fish	245	67.1
Fish for fun	127	32.1
Fish for Necessity	2	.5
Fun and Necessity	1	.3
Total	405	100.0

TABLE 16. RELATIONSHIP OF FISHING BEHAVIOR TO DEMOGRAPHIC VARIABLES AND FISH CONSUMPTION

	FISH		DON'T FISH		
GENDER	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL%
Male	84	52.5	79	47.5	100.0
Female	46	19.0	196	81.0	100.0
	130	32.1	275	77.9	100.0

Chi square = 47.28, df = 1, p < .001

	FISH		DON'T FISH		
AGE	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL%
< 20	15	57.7	11	42.3	100.0
20-49	86	36.4	150	63.6	100.0
> 49	27	19.6	111	80.4	100.0
Total	128	32.0	272	68.0	100.0
No response	2		3		

Chi square = 19.83, df = 2, p < .001

	FISH		DON'T FISH		
OCCUPATION	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL%
Professional	33	31.4	72	68.4	100.0
Laborer	34	40.5	50	59.5	100.0
Clerical	6	21.4	22	78.6	100.0
Homemaker	15	20.8	57	79.2	100.0
Retired	9	18.4	40	81.6	100.0
Other	14	58.3	10	41.7	100.0
Total	111	30.7	251	69.3	100.0
No response	19		24		

Chi square = 20.36, df = 5, p = .002

	FISH		DON'T FISH		
RACE	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL%
Black	25	26.0	71	74.0	100.0
White	104	34.7	196	65.3	100.0
Total	129	32.6	267	67.4	100.0
Other	1		8		

Chi square = 2.46, df = 1, p = .12

	FISH		DON'T FISH		
RELIGION	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL%
Catholic	81	35.8	146	64.2	100.0
Noncatholic	46	27.5	121	72.5	100.0
Total	127	34.0	267	66.0	100.0
No response	3		8		

Chi square = 2.92, df = 1, p = .09

	FISH		DON'T FISH		
INCOME	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL%
< $10,000	12	16.2	62	83.8	100.0
$10,000-24,999	34	32.4	71	67.6	100.0
$25,000-39,999	26	32.5	54	67.5	100.0
$40,000-80,000	32	44.4	40	55.6	100.0
> $80,000	5	41.7	7	58.3	100.0
Total	109	31.9	234	68.1	100.0
Don't know or	21		41		

Chi square = 14.30, df = 5, p = .014

TABLE 16. RELATIONSHIP OF FISHING BEHAVIOR TO DEMOGRAPHIC VARIABLES AND FISH CONSUMPTION (Cont'd)

	FISH		DON'T FISH		
SEWER	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL%
Yes	123	31.7	265	68.3	100.0
No	7	41.2	10	58.8	100.0
Total	130	32.2	275	67.8	100.0

Chi square = .66, df = 1, p = .42

	FISH		DON'T FISH		
FISH CONSUMPTION	NUMBER	PERCENT	NUMBER	PERCENT	TOTAL%
Ate in last week	95	38.3	153	61.7	100.0
Did not eat in last week	34	24.8	103	75.2	100.0
Never eat	1	5.0	19	95.0	100.0
Total	130	32.1	275	67.9	100.0

Chi square = 14.46, df = 1, p < .001

TABLE 17. DISTRIBUTION OF NUMBERS OF FISHING TRIPS PER YEAR BY RESPONDENTS

FISHING TRIPS	NUMBER	PERCENT
1	15	11.7
2-3	31	24.2
4-5	15	11.7
6-10	18	14.1
11-20	24	18.8
21-50	19	14.8
> 50	6	4.7
No response	2	----
Total	130	100.0

the total 130 people who fished, 24% reported 2-3 fishing trips. Less than 5% indicated that they fish more than 50 times per year.

Eighteen respondents reported catching fish in the past week, which included 2 people who fished for need. Table 18 shows that the preferred fishing location was almost equally divided between fresh water and salt water habitats, with salt water slightly favored. This may fluctuate with season.

Table 19 shows the types of fish and shellfish caught in the past week. Since some respondents caught more than 1 type of fish, the total number of responses is greater than the 18 individuals who indicated that they fished in the past week. The table shows that trout was the species most commonly caught, followed by catfish and flounder. Eleven respondents reported eating the fish they caught, while 6 did not. One person had an unsuccessful fishing trip.

While only 130 of 405 respondents reported that they fish for fun or for necessity (Table 15), it is interesting to note that the sources of 62% of the freshwater fin fish and over 50% of trout and other salt water fin fish were either fishing or gifts from anglers (Table 7).

While this survey targeted the general population, the survey also identified a large population that is affected by recreational

TABLE 18. PREFERRED FISHING HABITAT OF RESPONDENTS

SOURCE	NUMBER	PERCENT
Fresh Water		
River or bayou	7	39
Lake or pond	1	6
Swamp	0	0
Salt Water		
Marsh	4	22
Lake or pond	5	28
Gulf or ocean	1	6
Total	18	100

TABLE 19. TYPES OF FISH/SHELLFISH CAUGHT BY RESPONDENTS

TYPE	NUMBER	PERCENT
Crab	2	8
Crawfish	1	4
Catfish	4	15
Gar	1	4
Sunfish	1	4
Bass	1	4
Other fresh water	1	4
Speckled or white trout	7	27
Red fish	2	8
Croaker	1	4
Flounder	3	12
Shark	1	4
Other	1	4
Total	26	100

fishing as noted above. This population is significantly larger than that reported for Wisconsin and Michigan in a recent EPA workshop (EPA, 1991). In those states, surveys are based on the assumption that anglers consume the most fish, and are, therefore, at highest risk. In Wisconsin, for example, only 6.7 % of anglers consume 1 or more fish meals per week (EPA, 1991). In Louisiana, the amount of fishing and the generous distribution of fish to friends has a bearing on how a survey of the entire state should be conducted and on the interpretation of exposure data in assessment of risk from contaminated fish.

Table 20 shows the influence of special diets on fish and seafood consumption. Of the 385 respondents who reported eating seafood at some time, 69 were on a special diet. The diet types are given in the table along with the number of persons that said that their diet had altered their fish consumption.

III. Objective 4 - Conduct a "vendor" survey to determine what proportion of seafood distributed to area wholesalers and retailers is of Louisiana origin.

Seventy nine (79) wholesale seafood dealers and 43 retail seafood dealers were identified in the greater New Orleans area which included the parishes of Orleans, Jefferson, St. Bernard and Plaquemines. Of this number 76 wholesalers and 37 retailers

TABLE 20. THE ROLE OF SPECIAL DIETS IN FISH CONSUMPTION

DIET TYPE	NUMBER	PERCENT	ALTERED FISH CONSUMPTION NUMBER	ALTERED FISH CONSUMPTION PERCENT
Low Cholesterol	32	46.4	18	56.3
Low salt	13	18.8	2	15.4
Diabetic	5	7.2	2	40.0
Reducing	10	14.5	6	60.0
Other	3	4.3	2	67.7
Low chol and salt	5	7.2	3	60.0
High blood pressure	1	1.4	1	100.0
Total	69	99.8		

initially agreed to complete a survey form indicating the volume of seafood they handled (See Appendix 1).

While most vendors initially agreed to participate, the final response was very disappointing. Only 17 wholesalers and 9 retailers answered the survey despite 3 follow up telephone calls alternating with 3 mailings of survey forms over a period of 2 months. The final response rate, therefore, was 22% for wholesalers and 24% for retailers. With such a poor response, the data presented below must be viewed critically; at best the data indicate possible trends in the commercial seafood market.

The data collected in this exercise are presented in Tables 21 and 22. The data were normalized to a yearly basis, except for crawfish which is reported based on a 7 month season. Table 21 shows that the largest wholesale volumes were catfish, whole crabs, shrimp and crawfish. The same is true for retailers (Table 22).

The wholesale survey reflects Louisiana's status as the nation's second leading state in seafood landings (NMFS, 1990). Table 21 indicates that many Louisiana seafood products are exported. Since Louisiana lands far more seafood than can be consumed locally, it may be appropriate to assume that many of the seafood products sold in Louisiana originate locally. The exceptions may be catfish, some shrimp and perhaps crab claws.

TABLE 21. WHOLESALE VENDOR SURVEY [1]

Product	Total Pounds Sold	# Pounds Coming from Louisiana	# Pounds Sold in Louisiana	# Pounds Sold to: Restaurants	Groceries	Fish Markets	Institutions	General Public	Other	Not Categorized
Fish: catfish	315,000	75,000	291,000	123,000		156,000	24,000	12,000		
trout	68,000	68,000	20,000	12,000	2,400					53,600
flounder	12,000	12,000	6,000			1,200		240	1,200	9,360
sheephead	31,000	31,000	13,000						12,000	19,000
drum	12,000	12,000	6,000						6,000	6,000
redfish										
snapper										
grouper										
tuna										
swordfish										
Other Fish: (mullet)	26,000	26,000	26,000					1,000		4,653,520
Crabs: whole	4,655,000	4,655,000	578,000	480						139,520
crabmeat	140,000	140,000	10,000	480						7,000
claws	23,000	8,000	20,000	10,000	3,000	1,500	1,500			

[1] Data normalized to 1 year.
Response rate = 22%

TABLE 21. WHOLESALE VENDOR SURVEY (Cont'd) [1]

Product	Total Pounds Sold	# Pounds Coming from Louisiana	# Pounds Sold in Louisiana	# Pounds Sold to: Restaurants	Groceries	Fish Markets	Institutions	General Public	Other	Not Categorized
Shrimp	12954000	6,472,000	7,263,000	103,000	3,995,000	42,000	5,000	78,000	3,834,000	4,897,000
Oysters: sacks	132,000	130,000	13,000	4,000				160	90,000	37,840
shucked	181,320	171,000	170,000	171,000	3,400	2,000		320	4,600	
Crawfish	525,000	525,000								
Alligator	2,000	2,000								
Other (turtle, frog squid, etc.- specify)										
Processed Product: Choupique Roe	324	324	324	304	20					
gumbo	351,000	351,000	140,000	246,000	35,000		70,000			
Shrimp Creole	108,000	108,000	43,000	75,000	11,000		22,000			
Crawfish Etouffe	54,000	54,000	22,000	38,000	5,000		11,000			
Turtle Soup	27,000	27,000	11,000	19,000	3,000		5,000			

[1] Data normalized to 1 year.
Response rate = 22%

TABLE 22. RETAIL VENDOR SURVEY

Product	Total Pounds Sold	# Pounds Coming from Louisiana	# Pounds Sold in Louisiana
Fish: catfish	52,000	9,000	52,000
trout	30,000	28,000	30,000
flounder	600	600	600
sheephead			
drum	240	240	240
redfish			
snapper	3,000	960	3,000
grouper	2,400	1,200	2,400
tuna	1,440	1,440	1,440
swordfish	240	240	240
Other Fish: salmon	840		840
Tilapia	540		540
Crabs: whole	220,000	220,000	220,000
crabmeat	6,900	6,900	6,900
claws	4,140	4,140	4,140

[1] Data normalized to 1 year
Response rate = 24%

TABLE 22. RETAIL VENDOR SURVEY (Cont'd)

Product	Total Pounds Sold	# Pounds Coming from Louisiana	# Pounds Sold in Louisiana
Shrimp	248,000	203,000	242,000
Oysters: in shell	1,200	1,200	1,200
shucked	1,330	1,330	1,330
Crawfish	844,400	844,400	830,000
Alligator	360	360	60
Other (turtle, frog squid)	240	120	240
Processed Product (specify)			

[1] Data normalized to 1 year
Response rate = 24%

IV. Ancillary Data

The number of fishing licenses held by Louisiana residents also reflects the prominence of fish and shellfish in the state. Figures 1 - 4 show licensing activity for 1989-1991 (LDWF, 1990; LDWF 1991). In 1991, commercial licenses totalled 90,056 (Fig. 1). While most licenses were held in coastal parishes, as expected, there were commercial license holders in virtually ever parish. In 1990, over 500,000 Louisianians held resident fishing licenses (Fig. 2). These were distributed throughout the state with all parishes represented. Figure 3 shows that salt water resident licenses numbered over 200,000 and, while the southern parishes had the highest numbers, the northern parishes were also represented. Hook and line licenses were also well represented in the state (Fig. 4) with a total of over 15,000.

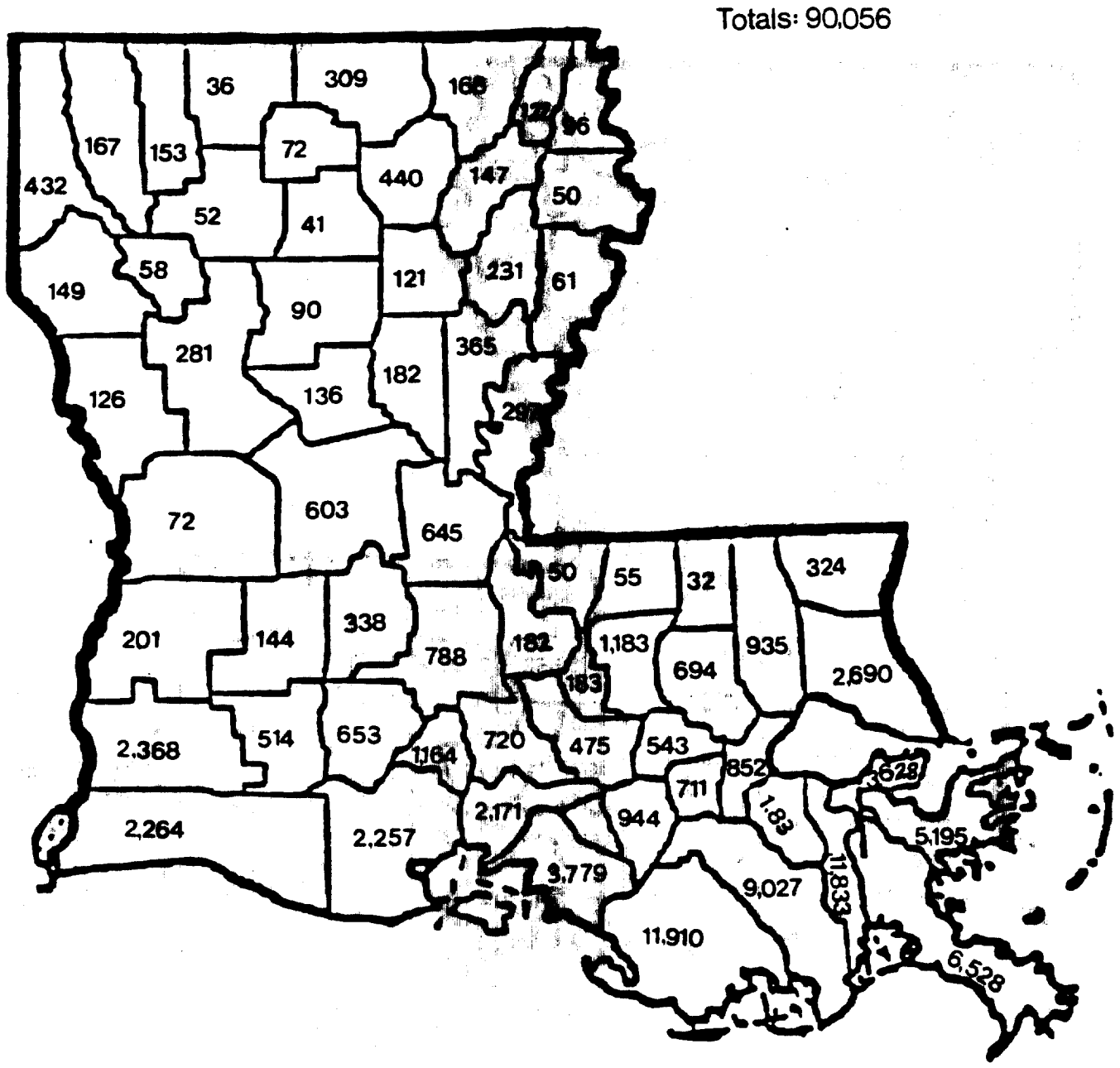
CONCLUSIONS AND RECOMMENDATIONS

This study reflects the popularity of sport fishing and of seafood in the New Orleans area. While anglers represented 32% of those interviewed (130 anglers of 405 persons interviewed), they distributed much of their catch to friends. Consequently, both anglers and non anglers have ready access to fresh Louisiana seafoods.

Clearly, New Orleanians enjoy seafood. Ninety five percent of those interviewed reported eating seafood; 61% of those reported eating at least 1 seafood meal in the previous week. Favorites

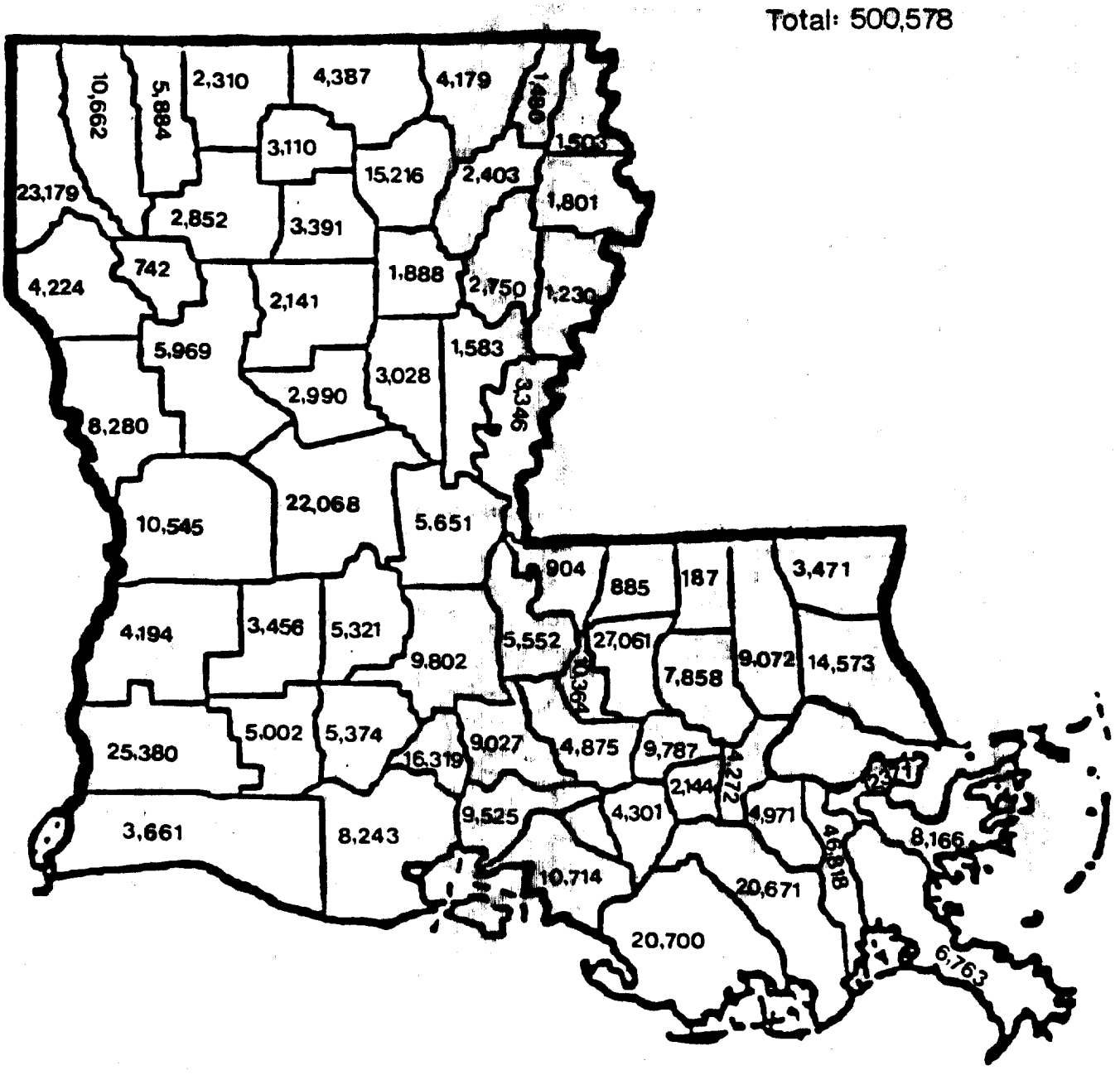
COMMERCIAL LICENSE

FIGURE 1



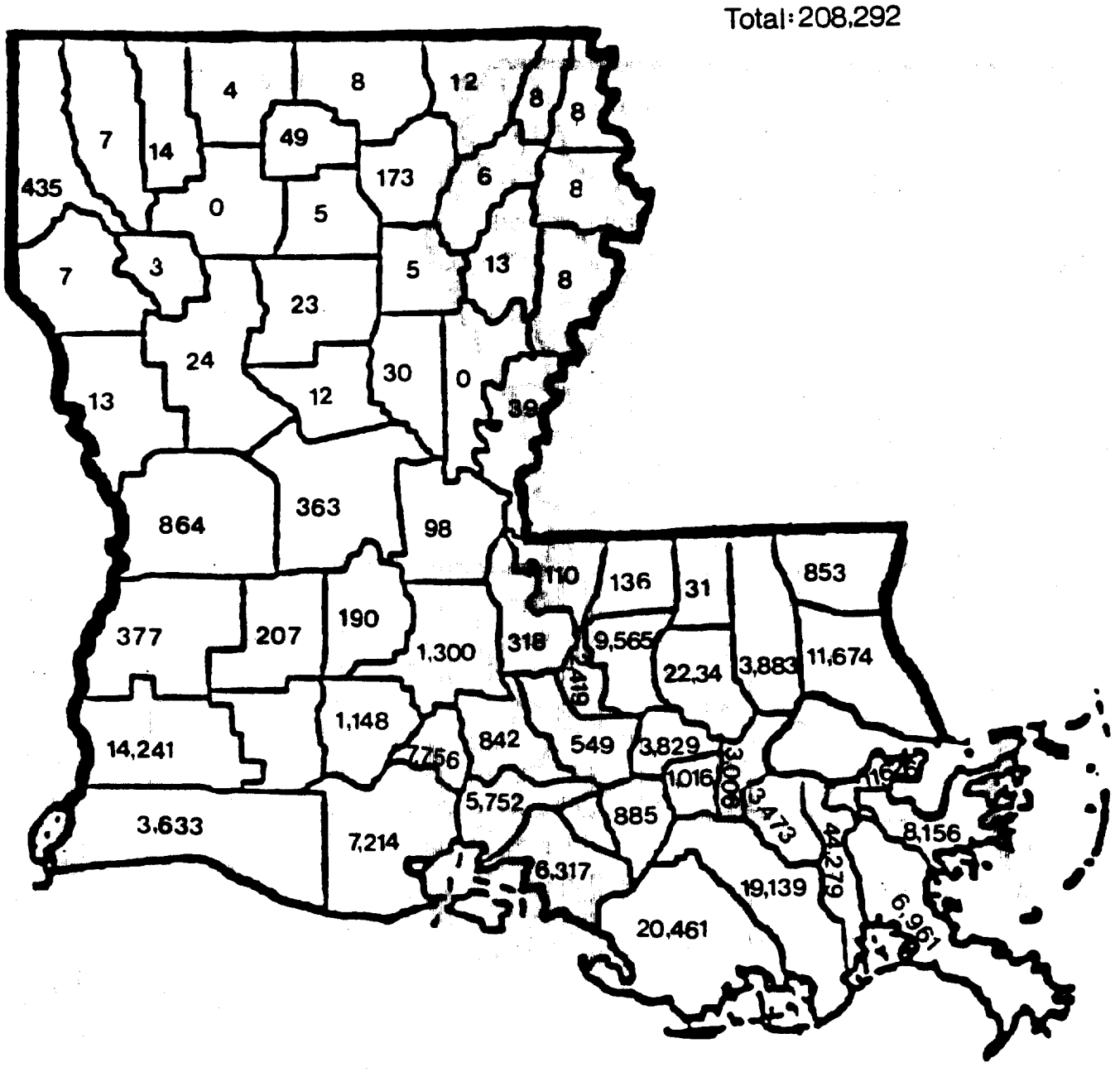
RESIDENT FISHING LICENSES

FIGURE 2

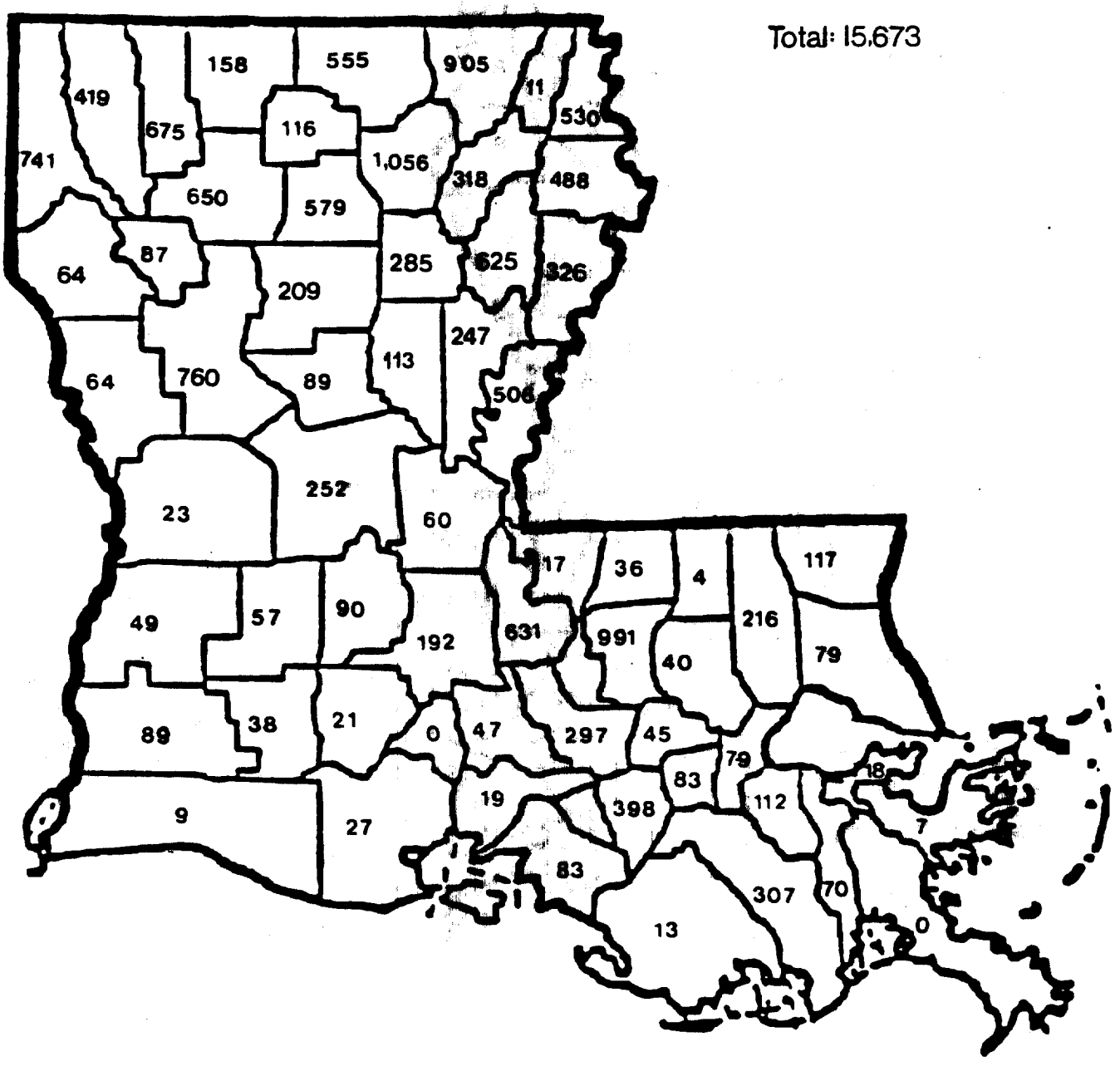


RESIDENT SALTWATER LICENSES

FIGURE 3



HOOK & LINE LICENSES
FIGURE 4



included shrimp, catfish, trout and crabs. Other salt water fish were also popular.

This survey indicated that crawfish, other fresh water fin fish and oysters were not as popular as the species noted above. This may be an artifact of the season: summer is not prime time for oysters and the crawfish season was basically over. It is not clear if the fresh water fin fish consumption rate is influenced by season. This is an important consideration if site specific risk assessments are to include fresh water fish as potential exposure sources.

Seafood consumption rates for the general population were calculated. The median daily rates, based on 1 seafood meal per week, for selected species are as follows: catfish - 22.7 grams; other fresh water fish - 10.4 grams; speckled trout - 30.8 grams; other salt water fish - 29 grams; shrimp - 16.3 to 32.6 grams; crabs - 26 grams; crawfish - 13.6 to 19.5 grams. The median daily rates, based on 2 seafood meals per week, for selected species are: catfish - 49.5 grams; other fresh water fish - 20.9 grams; speckled trout - 61.5 grams; other salt water fish - 58 grams; shrimp - 32.6 to 65.1 grams; crabs - 52 grams; crawfish - 26 to 39 grams.

There were no differences in seafood consumption with race, income, gender or religion. The community is homogeneous in its affection for seafood; minority and low income populations in the

New Orleans area do not appear to be at additional risk if fish or seafood are exposure pathways for a given toxic chemical.

There was a very poor response rate to the vendor survey (22-24%), despite repeated mailings and follow up telephone calls. Thus, this survey can only indicate trends in the commercial seafood market in the New Orleans area. The largest wholesale volumes were catfish, whole crabs, shrimp and crawfish. The same was true of the retail market.

Since Louisiana is the nation's second leading state in seafood landings, it may be assumed that many of the products sold at retail in Louisiana originate locally. The exceptions are catfish, some shrimp and perhaps crab claws. This is an important consideration in site specific risk assessments where various fish species may be potential exposure routes.

Recommendation for further work based on the findings of this study in the greater New Orleans area are as follows:

- A fish/seafood consumption study should be conducted state wide using the general population as the target audience.
- The survey should be done over a full year to account for seasonal variations in seafood consumption patterns.

APPENDIX I

ACKNOWLEDGEMENT

This study was conducted under the Louisiana Department of Environmental Quality (LDEQ), Office of Water Resources, Water Quality Management Division, J. Dale Givens, Assistant Secretary, through a contract with Tulane University School of Public Health and Tropical Medicine, Department of Environmental Health Sciences, contract number 24400-91-18. For the Louisiana Department of Environmental Quality, Stephanie Braden served as contract manager and was assisted in technical review by Barbara Romanowsky, Cindy Chritton-Meeker, Karl Fohn and Dugan Sabins. We wish to express our sincere thanks to LDEQ personnel for their generous administrative and technical assistance, and for their patience.

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APPENDIX 1. LOUISIANA SEAFOOD CONSUMPTION SURVEY (Cont'd)
-WHOLESALE MARKET-

Product	Total Pounds Sold	# Pounds Coming from Louisiana	# Pounds Sold in Louisiana	# Pounds Sold to: Restaurants	Groceries	Fish Markets	Institutions	General Public	Other	Not Categorized
Shrimp										
Oysters: in shell										
shucked										
Crawfish										
Alligator										
Other (turtle, frog squid, etc.- specify)										
Processed Product (specify)										

4. On the back of the page, please list any of your suppliers that you feel may be able to assist us further in idenfying sources and quantities of Louisiana seafood.

THANK YOU AGAIN FOR YOUR TIME AND INTEREST IN OUR PROJECT!

APPENDIX 1 . LOUISIANA SEAFOOD CONSUMPTION SURVEY
-WHOLESALE MARKET-

1. Name of Wholesaler:_____

2. The data provided below are based on the most recent: (check one):
year_____ quarter_____ month_____

3. Please fill in the number of pounds (or gallons, for oysters) in the appropriate categories:

Product	Total Pounds Sold	# Pounds Coming from Louisiana	# Pounds Sold in Louisiana	# Pounds Sold to: Restaurants	Groceries	Fish Markets	Institutions	General Public	Other	Not Catergorized
Fish: catfish										
trout										
flounder										
sheephead										
drum										
redfish										
snapper										
grouper										
tuna										
swordfish										
Other Fish: (specify)										
Crabs: whole										
crabmeat										
claws										

APPENDIX 1. LOUISIANA SEAFOOD CONSUMPTION SURVEY
-RETAIL MARKET-

1. Name of Retailer:_____

2. The data provided below are based on the most recent: (check one):
year_____ quarter_____ month_____

3. Please fill in the number of pounds (or gallons, for oysters) in the appropriate categories:

Product	Total Pounds Sold	# Pounds Coming from Louisiana	# Pounds Sold in Louisiana
Fish: catfish			
trout			
flounder			
sheephead			
drum			
redfish			
snapper			
grouper			
tuna			
swordfish			
Other Fish: (specify)			
Crabs: whole			
crabmeat			
claws			

APPENDIX 1. LOUISIANA SEAFOOD CONSUMPTION SURVEY (Cont'd)
-RETAIL MARKET-

Product	Total Pounds Sold	# Pounds Coming from Louisiana	# Pounds Sold in Louisiana
Shrimp			
Oysters: in shell			
shucked			
Crawfish			
Alligator			
Other (turtle, frog squid, etc.- specify)			
Processed Product (specify)			

APPENDIX II

APPENDIX II

Date:_____

Behavioral Questionnnaire

Final Disposition of Telephone Call: ☐☐

HELLO, I'm _____ calling for the Louisiana Department of Environmental Quality. We're doing a study of the health practices of Louisiana residents. Your number has been chosen randomly in order to be included in the study, and we'd like to ask some questions about things people do which may affect their health.

Is this Area Code ☐☐☐ Prefix ☐☐☐ ☐☐☐☐

No → *Thank you very much, but I seem to have dialed the wrong number. It's possible that your number may be called at a later time.* STOP

Is this a private residence?

No → *Thank you very much, but we are only interviewing in private residences.* STOP

	Date	Time	Time	Time	Time	ID	Comments
⊘ Line busy							
● No answer							

Appointments:

	Today's date/time	Spoke with	Ask for	Call-back date & time	ID	Comments
1.						
2.						

01 - Completed interview
02 - Refused interview
03 - Non-working number.
04 - No answer (multiple times).
05 - Business phone.
06 - No eligible respondent at this number.
07 - No eligible respondent could be reached during time period.
08 - Language barrier prevented completion of interview.
09 - Interview terminated within questionnaire.
10 - Line busy (multiple tries).
11 - Selected respondent unable to respond because of physical or mental impairment.

Our study requires that we interview only one person who lives in your household. How many members of your household, including yourself, are 13 years of age or older?

Who is the eldest man who presently lives in this household?
Who is the next eldest man who presently lives in this household?
Etc.

Who is the eldest woman who presently lives in this household?
Who is the next eldest woman who presently lives in this household?
Etc.

_____ *Last digit of phone number* _____

Name or Relationship	0	1	2	3	4	5	6	7	8	9	
1.	1	1	1	1	1	1	1	1	1	1	1.
2.	2	1	2	1	2	1	2	1	2	1	2.
3.	3	1	2	3	1	2	3	1	2	X	3.
4.	1	2	3	4	1	2	3	4	X	X	4.
5.	2	3	4	5	1	2	3	4	5	1	5.
6.	5	6	1	2	3	4	X	X	X	X	6.
7.	2	3	4	5	6	7	1	X	X	X	7.
8.	8	1	2	3	4	5	6	7	X	X	8.

The person in your household that I need to speak with is

Fish and Shellfish Consumption

Code: 1-_ 2-_ 3-_ 4-(x)

13. Do you ever eat fish or shellfish. Yes...5-1--SKIP to Q. 15
No.... -2--Continue

14. If not, why not?

I am allergic to it.....6-1
I don't like the taste.....7-1
I don't like the smell.....8-1
I don't like to touch it.....9-1
My family doesn't like it...10-1
It is too expensive.....11-1
It is too hard to get.....12-1
I don't like the kind available.....13-1
I don't like the quality..14-1
It is against my beliefs..15-1
I am afraid it might be contaminated.....16-1
17-

Other_____

SKIP TO THE FISHING PRACTICES SECTION....Q. 37

15. Have you eaten any fish or shellfish in the last week? This includes breakfast, lunch, dinner and snacks.

No...18-0 (SKIP TO Q.30) Yes---Which occasions? (RECORD BELOW)

For each occasion ask questions 16-27. Begin with the previous day, and continue until the respondent cannot remember he or she has responded for a full week.

16. What type of fish or shellfish did you eat for:

Shellfish
- Shrimp....................01
- Oysters....................02
- Crab....................03
- Crawfish....................04

Fresh Water Fish
- Catfish....................11
- Gar....................12
- Perch....................13
- Choupic....................14
- Sunfish, Sac au Lait or Crappie..........15
- Bass....................16
- Other (SPECIFY)__________ 17

Salt Water and estuary (brackish water) fish
- Speckled or White Trout..21
- Red Fish or other drum...22
- Sheephead....................23
- Croaker....................24
- Flounder....................25
- Tuna....................26
- Shark....................27
- Red Snapper....................28
- Other (SPECIFY)__________ 29

Other (SPECIFY)__________ 31
Seafood Platter....................32
Other combinations (SPECIFY)______ 33
Don't Know....................99

	Breakfast..18-1							Lunch..19-1							Dinner.20-1								
	22-	31-	40-	49-	58-	67-	76-	10-	19-	28-	37-	46-	55-	64-	73-	6-	15-	24-	33-	42-	51-	60-	69
Day	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	
Dominant:	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	(
	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	(
	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	(
	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	(
							4-(y)																
	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	(
	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	(
	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	(
	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	( )	(

4-(0)

17. Where did the fish or shellfish come from?	30-	39-	40-	57-	66-	75-	9-	18-	27-	36-	45-	54-	63-	72-	5-	14-	23-	32-	41-	50-	59-	68-	77
You caught it..............................	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
A friend/relative caught it................	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
You bought it from a fish market...........	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
You bought it from a grocery store..........	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
You bought it from street vendor/fisherman..	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Restaurant (SKIP TO Q.21)....................	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Other (SPECIFY)__________	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Don't know..................................	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

		Breakfast							Lunch							Dinner							Snack				
18. If you caught it or a friend/relative caught	48-	55-	62-	69-	76-	7-	14-		21-	28-	35-	42-	49-	56-	63-	70-	77-	8-	15-	22-	29-	36-	43-	50-	57-	64-	
where did you catch it? Day	M	T	W	T	F	S	S		M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	
Fresh water	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
River or bayou	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Lake	3	3	3	3	3	3	3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Swamp	4	4	4	4	4	4	4		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Stocked pond																											
Salt or brackish water	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Marsh or estuary	6	6	6	6	6	6	6		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
Lake	7	7	7	7	7	7	7		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
Gulf or ocean																											
19. If you bought it from a market or a store, which one, _____	49-	56-	63-	70-	77-	8-	15-		22-	29-	36-	43-	50-	57-	64-	71-	78-	9-	16-	23-	30-	37-	44-	51-	58-	65-	
	50-	57-	64-	71-	78-	9-	16-		23-	30-	37-	44-	51-	58-	65-	72-	79-	10-	17-	24-	31-	38-	45-	52-	59-	66-	
20. Was it: _____	51-	58-	65-	72-	79-	10-	17-		24-	31-	38-	45-	52-	59-	66-	73-	80-	11-	18-	25-	32-	39-	46-	53-	60-	67-	
Canned (SKIP TO Q.27)	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Fresh	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Frozen	3	3	3	3	3	3	3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Smoked	4	4	4	4	4	4	4		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Pickled	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Other (SPECIFY) _____	6	6	6	6	6	6	6		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
Don't know	7	7	7	7	7	7	7		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
21. How was it prepared?	52-	59-	66-	73-	80-	11-	18-		25-	32-	39-	46-	53-	60-	67-	74-	5-	12-	19-	26-	33-	40-	47-	54-	61-	68-	
																	4-(3)										
Raw	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Boiled, stewed or in a gumbo	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Broiled or grilled	3	3	3	3	3	3	3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Fried	4	4	4	4	4	4	4		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Baked	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Other (SPECIFY) _____	6	6	6	6	6	6	6		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
Don't know	7	7	7	7	7	7	7		7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
22. For fish, did you eat the skin?	53-	60-	67-	74-	4-(2) 5-	12-	19-		26-	33-	40-	47-	54-	61-	68-	75-	6-	13-	20-	27-	34-	41-	48-	55-	62-	69-	
Yes	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
No	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Don't know	3	3	3	3	3	3	3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
23. For fish, did you eat the internal organs, as the liver?	54-	61-	68-	75-	6-	13-	20-		27-	34-	41-	48-	55-	62-	69-	76-	7-	14-	21-	28-	35-	42-	49-	56-	63-	70-	
Yes	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
No	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Don't know	3	3	3	3	3	3	3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	

	Day	Breakfast 4-(5)							Lunch							Dinner							Snac			
		16- M	29- T	42- W	55- T	68- F	5- S	18- S	31- M	44- T	57- W	70- T	8- F	21- S	34- S	47- M	60- T	73- W	10- T	23- F	36- S	49- S	62- M	75- T	12- W	25 T
24. For fish, did you eat the roe (eggs)																										
Yes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
No		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
25. For fish, was it:		17-	30-	43-	56-	69-	6-	19	32-	45-	58-	71-	9-	22-	35-	48-	61-	74-	11-	24-	37-	50-	63-	76-	13-	2(
Whole		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Filet or steak		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Nugget/strips/pieces		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Other (SPECIFY)_____		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Don't know		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
26. For crawfish, did you suck the heads?		18-	31-	44-	57-	70-	7-	20	33-	46-	59-	72-	10-	23-	36-	49-	62-	75-	12-	25-	38-	51-	64-	77-	14-	27
Yes		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
No		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
27. How much did you eat?		19-	33-	45-	58-	71-	8-	21-	34-	47-	60-	73-	11-	24-	37-	50-	63-	76-	13-	26-	39-	52-	65-	78-	15-	28-
Fish, oysters or crabs, how many?		20-	83-	46-	59-	72-	9-	22-	35-	48-	61-	74-	12-	25-	38-	51-	64-	77-	14-	27-	40-	53-	66-	79-	16-	29-
Shrimp/crawfish/crabmeat, how many?		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
or how many pounds?		22-	35-	41-	61-	74-	11-	24-	32	50-	63-	76-	14-	22-	40-	53-	66-	79-	16-	29-	43-	55-	68-	5-	18-	31-

4-(8)

Codes: 1..Under 1/4 lb. 4..3/4 but less than 1 lb. 7..2 lbs. but less than
2..1/4 but less than 1/2 lb. 5..1 lb. but less than 1 1/2 lbs. 8..3 lbs. but less than
3..1/2 but less than 3/4 lb. 6..1 1/2 lbs. but less than 2 lbs. 9..4 or more lbs.

CANNED: How many ounces did you eat?	23-	36-	49-	62-	75-	10-	25-	33	51-	64-	79-	15-	28-	41-	54-	67-	80-	17-	30-	43-	56-	69-	6-	19-	32-
Fish eaten whole or filet:	24-	37-	50-	63-	76-	13-	26-	39-	52-	65-	78-	16-	29-	42-	55-	68-	5-	18-	31-	44-	57	70-	7-	20-	33-
How long was it.....	25-	38-	51-	64-	77-	14-	27-	40-	53-	66-	29-	17-	30-	43-	56-	69-	6-	19-	32-	45-	58-	71-	8-	21-	34-
How thick was it.....	26-	39-	62-	65-	78-	15-	28-	41-	54	67-	80-	18-	31-	44-	57-	70-	7-	20-	33-	46-	59-	72-	9-	22-	35-
How wide was it.....	27-	40-	53-	66-	79-	16-	29-	42-	55-	68-	5-	19-	32-	45-	57-	71-	8-	21-	34-	47-	60-	73-	10-	23-	36-

4-(6)

Other forms of fish compare it to a food quarter pound hamburger. Is it:	28-	41-	54-	67-	80-	17-	30-	43-	56-	69-	7-	20-	33-	46-	59-	72-	9-	22-	35-	48-	61-	74-	11-	24-	37-	5
About the same size	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Larger	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Smaller	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

28. Was your fish consumption last week typical?
Yes.....77 -1 No....-2

29. If not, was it:
Less than usual 70-1 Greater than usual..-2
Other(SPECIFY)_____-3

30. Are there times of the year during which you eat more or shellfish than usual? Yes.....79 -1 No....-2

31. If yes, is it for: Religious reasons.....
Certain fish or seafood is in seas
Other (SPECIFY)_____

IF FEMALE - CONTINUE. IF MALE - SKIP TO Q.35

32. Are you pregnant? yes..8-1 Continue No. -2 Go to Q35

33. Have you changed your fish or shellfish consumption during the pregnancy? Yes..9-1 continue No.-2 go to Q.35

34. How has it changed? Stopped eating fish & shellfish... 10-1
Eat less..... -2
Eat more..... -3
Other(SPECIFY)_____ -4
Don't know..... -5

35. Are you on a special diet such as:
Low cholesterol..11-1 Reducing..... -4
Low salt..... -2 Other (SPECIFY)_____-5
Diabetic..... -3 No..SKIP TO Q.37..... -6

36. Has this altered your fish or shellfish consumption? Yes..12-1
No... -2

FISHING PRACTICES

37. Do you catch fish or shellfish for fun (even though you may eat them), is catching fish or shellfish a necessity for feeding yourself or your family, or do you catch fish or shellfish for selling to others?
Fun.....13-1 ASK Q.38-43, THEN SKIP TO DEMOS
Necessity.....-2 SKIP TO Q.45
For selling only...-3 SKIP TO DEMOS
None/don't fish....-4 SKIP TO DEMOS
IF COMBINATIONS OF ABOVE, ASK ALL APPROPRIATE QUESTIONS.

38. How many times a year do you catch fish or shellfish for fun? ____ ____ ____ 14/15/16

39. Did you catch fish or shellfish for fun in the last week? Yes..17-1 CONTINUE
No.... -2 GO TO Q.45 OR DEMOS

40. If yes, where?
Fresh water
River or bayou.18-1
Lake/pond.....19-1
Swamp.....20-1
Salt water or brackish water
Marsh.....21-1
Lake/pond.....22-1
Gulf or ocean.23-1

41. What did you catch?

	CODE	RECORD TWO DIGIT CODE HERE
Shellfish		
Shrimp	01	__ __ 24/25
Oysters	02	
Crab	03	
Crawfish	04	
Fresh water fish		
Catfish	11	
Gar	12	
Perch	13	
Choupic	14	__ __ 26/27
Sunfish, sac au lait or crappie	15	
Bass	16	
Other_____	17	
Salt water/estuary (brackish water) fish		
Speckled or white trout	21	
Red fish or other drum	22	__ __ 28/29
Sheephead	23	
Croaker	24	
Flounder	25	
Tuna	26	
Shark	27	
Red snapper	28	
Other_____	29	__ __ 30/31
Other_____	31	
Don't know	99	

42. How much did you catch?
For fish/oysters/crabs, how many? __ __ 32/33
For shrimp or crawfish,how many pounds? __ __ 34/35
Don't know.....99

43. Did you eat the fish or shellfish that you caught? Yes.36-1
No.. -2 KEYPUNCH: SKIP COL.37

45. How many times a year do you catch fish or shellfish in order to feed yourself or your family?
____ ____ ____38/39/40

46. Did you catch the fish or shellfish in order to feed your family in the last week?
Yes..41-1 cotinue
No... -2 go to demos

47. Where did you catch the fish or shellfish in the last week?

Fresh Water		Salt water or brackish water	
River or bayou	42-1	Marsh	45-1
Lake/pond	43-1	Lake/pond	46-1
Swamp	44-1	Gulf or ocean	47-1

48. What did you catch in the last week?

	CODE	
Shellfish		RECORD TWO DIGIT CODE HERE
Shrimp	01	
Oysters	02	
Crab	03	
Crawfish	04	__ __ 48/49
Fresh water fish		
Catfish	11	
Gar	12	
Perch	13	
Choupic	14	
Sunfish, sac au lait or crappie	15	__ __ 50/51
Bass	16	
Other _____	17	
Salt water/estuary (brackish water) fish		
Speckled or white trout	21	__ __ 52/53
Red fish or other drum	22	
Sheephead	23	
Croaker	24	__ __ 54/55
Flounder	25	
Tuna	26	
Shark	27	
Red snapper	28	
Other _____	29	
Other _____	31	
Don't know	99	

42. How much did you catch <u>in the last week</u>?

For fish, oysters or crabs, how many? __ __ 56/57
For shrimp or crawfish, how many pounds? __ __ 58/59
Don't know.....99

43. Did you eat the fish or shellfish that you caught <u>in the last week</u>? Yes.....60-1 No..... -2

<u>Demographics:</u>

1. Are you: Male...61-1 Female...-2
2. How old are you (in years)? ____ ____ 62/63
3. How much do you weigh (in pounds)? ____ ____ ____ 64/65/66
4. Are you currently in school? Yes..67-1 No..-2
5. IF YES: What grade are you in? ____ ____ 68/69
   IF NO: How many grades did you finish? ____ ____ 70/71
6. IF NOT IN SCHOOL: What is your occupation? (WRITE IN): _____

Professional	72-1	Homemaker	-4
Skilled labor	-2	Unemployed	-5
Unskilled labor	-3	Other	-6

7. What is your race? Black...73-1 White...-2
8. What is your religion? Catholic..74-1 Protestant -2 Jewish.... -3 Other: _____ -4 None.....-5
9. What is your family income? Is it:

Less than $10,000	75-1	$40,000-$80,000	-4
$10,000-$24,999	-2	Greater than $80,000	-5
$25,000-$39,999	-3		

10. How many years have you lived in Louisiana? ___ ___ 76/77
11. Are you on a city sewer system or do you have a septic tank?

City sewer system...78-1 Septic tank..-2

I certify that the data recorded on this and the previous pages is the complete and accurate response reported to me by the respondenct whose name and phone is indicated on the first page.

Interviewer _____ Date: _____